Volunteer Lake Assessment Program Individual Lake Reports

SPOFFORD LAKE, CHESTERFIELD, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	2,880	**Max. Depth (m):**	19.5	**Flushing Rate (yr^{1})**	0.2
Surface Area (Ac.):	707	**Mean Depth (m):**	9.1	**P Retention Coef:**	0.82
Shore Length (m):	8,400	**Volume (m^{3}):**	26,020,500	**Elevation (ft):**	716

TROPHIC CLASSIFICATION

Year	Trophic class
1988	OLIGOTROPHIC
1995	OLIGOTROPHIC

KNOWN EXOTIC SPECIES

The Waterbody Report Card tables are generated from the DRAFT 2014 305(b) report on the status of N.H. waters, and are based on data collected from 2004-2013. Detailed waterbody assessment and report card information can be found at www.des.nh.gov/organizations/divisions/water/wmb/swqa/index.htm

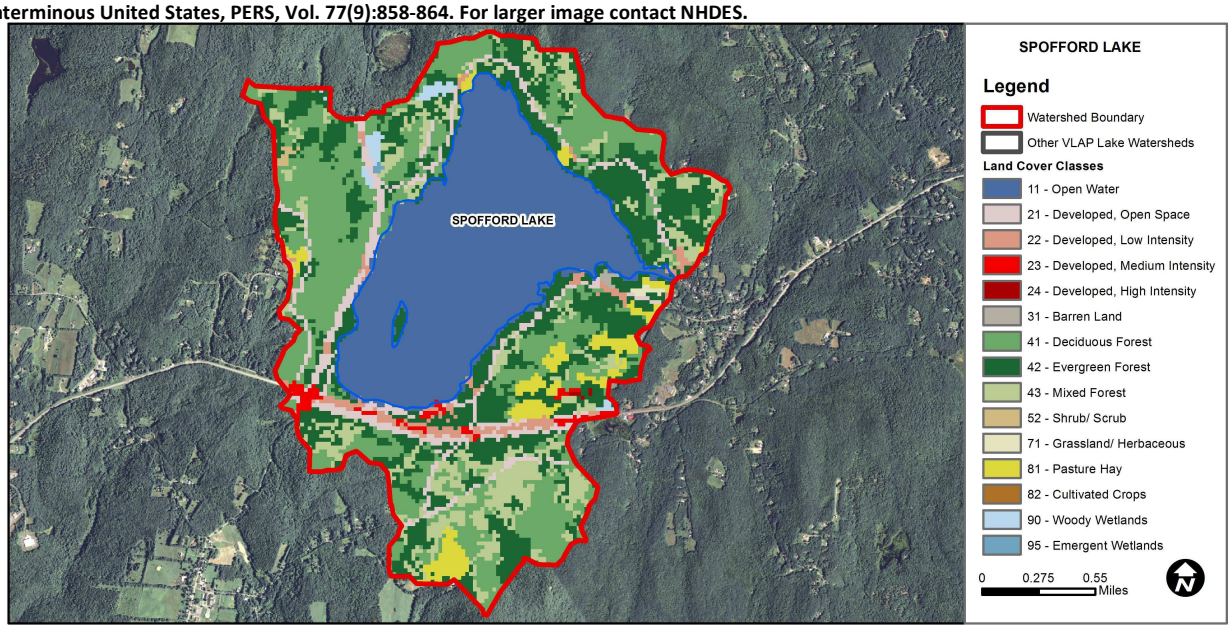
Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Good	The calculated median is from 5 or more samples and is < indicator and > 1/2 indicator and the chlorophyll a indicator is okay.
	pH	Slightly Bad	>10% of samples exceed criteria by a small margin (minimum of 2 exceedances).
	Oxygen, Dissolved	Bad	There are >10% of samples (minimum of 2), exceeding criteria with one or more samples considered large exceedance.
	Dissolved oxygen satura	Slightly Bad	There are >10% of samples (minimum of 2), exceeding criteria.
	Chlorophyll-a	Good	The calculated median is from 5 or more samples and is < indicator and > 1/2 indicator.
Primary Contact Recreation	Escherichia coli	Good	There are geometric means and all geometric means are < geometric mean criteria; and there has been a single sample exceedance.
	Chlorophyll-a	Very Good	There are a total of at least 10 samples with 0 exceedances of indicator.

BEACH PRIMARY CONTACT ASSESSMENT STATUS

SPOFFORD LAKE - ROADS END FARM BEACH	Escherichia coli	Good	There are geometric means and all geometric means are < geometric mean criteria; and there has been a single sample exceedance.
SPOFFORD LAKE - CAMP SPOFFORD BEACH	Escherichia coli	Good	There are geometric means and all geometric means are < geometric mean criteria; and there has been a single sample exceedance.
SPOFFORD LAKE - WARES GROVE TOWN BEACH	Escherichia coli	Good	There are geometric means and all geometric means are < geometric mean criteria; and there has been a single sample exceedance.
SPOFFORD LAKE - N SHORE RD TOWN BEACH	Escherichia coli	Good	There are geometric means and all geometric means are < geometric mean criteria; and there has been a single sample exceedance.
SPOFFORD LAKE - ACCESS RD TOWN BEACH	Escherichia coli	No Data	No data for this parameter.

WATERSHED LAND USE SUMMARY

Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, PERS, Vol. 77(9):858-864. For larger image contact NHDES.



Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	29.9	Barren Land	0.12	Grassland/Herbaceous	0.13
Developed-Open Space	5.92	Deciduous Forest	23.2	Pasture Hay	3.44
Developed-Low Intensity	2.06	Evergreen Forest	23.48	Cultivated Crops	0
Developed-Medium Intensity	0.92	Mixed Forest	9.89	Woody Wetlands	0.71
Developed-High Intensity	0.05	Shrub-Scrub	0.13	Emergent Wetlands	0.05

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2014 Data Summary

Observations and Recommendations (*Refer to Table 1 and Historical Deep Spot Data Graphics)*

- **Chlorophyll-a:** Chlorophyll levels remained stable and low from June through August. Average chlorophyll levels decreased slightly from 2013 and were much less than the state median. Historical trend analysis indicates relatively stable chlorophyll with moderate variability between years.
- **Conductivity/Chloride:** Deep spot and tributary conductivity and chloride levels were elevated, particularly in Camp Spofford Inlet, Clarkdale Pipe and Seamans Inlet. Historical trend analysis indicates significantly increasing (worsening) epilimnetic conductivity data since monitoring began.
- **E. coli:** Tributary E. coli levels were less than the state standard for surface waters (406 cts/100 mL) on each sampling event. Beach and Island E. coli levels were much less than the state standard for public beaches (88 cts/100 mL) on each sampling event.
- **Total Phosphorus:** Epilimnetic and Metalimnetic phosphorus levels remained stable and low from June through August. Average epilimnetic phosphorus levels decreased greatly from 2013 and were much less than the state median. Historical trend analysis indicates relatively stable epilimnetic phosphorus with moderate variability between years. Hypolimnetic phosphorus levels were within an average range and remained stable from June through August. Boat Launch, Clarkdale Pipe, Outlet, Seamans Inlet, Shield Inlet, and Wares Grove Inlet phosphorus levels were low to average and within average ranges for those stations. Camp Spofford Inlet phosphorus levels were elevated on each sampling event and phosphorus levels have significantly increased (worsened) since monitoring began.
- **Transparency:** Transparency was high (good) in June, decreased in July due to recent storms, high water levels, and wave action during sampling, and then remained at a lower level in August also as a result of wave action during sampling. Average transparency improved slightly from 2013 and was much better than the state median, however historical trend analysis indicates significantly decreasing (worsening) transparency since monitoring began. Transparency measured with the viewscope (VS) was generally much better than that measured without and likely a better representation of actual conditions.
- **Turbidity:** Epilimnetic and metalimnetic turbidity increased slightly as the summer progressed but remained at low levels. Hypolimnetic turbidity remained stable and low from June through August. Boat Launch, Outlet and Wares Grove Pipe turbidities were low from June through August. Camp Spofford Inlet turbidity was elevated in August potentially due to iron bacteria as noted on the sample receipt checklist. Clarkdale Pipe turbidity was elevated on each sampling event and historically was a result of iron bacteria and precipitate. Shield Inlet turbidity was elevated and increased as the summer progressed and stream flow decreased. Seamans Inlet turbidity was low in June and increased in July and August.
- **pH:** Epilimnetic and Metalimnetic pH levels were within the desirable range 6.5-8.0 units, however Hypolimnetic pH was less than desirable in July and August. Tributary pH levels were within the desirable range. Historical trend analysis indicates stable epilimnetic pH since monitoring began.
- **Recommended Actions:** Camp Spofford Inlet has experienced a significant increase in phosphorus levels since monitoring began and particularly since 2000. Conduct a stream walk and work with Camp management and upstream property owners to identify potential sources of phosphorus as well as reduce stormwater runoff to the tributary. Potential sources of phosphorus could include fertilizers, agriculture, and septic systems. Contact the VLAP Coordinator for assistance. High water levels from significant storm events caused erosion of the Island shoreline, and likely other shoreline properties. Encourage property owners to plant native vegetation to reduce the risk of shoreline erosion. Keep up the great work!

Table 1. 2014 Average Water Quality Data for SPOFFORD LAKE

Station Name	Alk. mg/l	Chlor-a ug/l	Chloride mg/l	Cond. uS/cm	E. Coli #/100ml	Total P ug/l	Trans. m NVS	Trans. m VS	Turb. ntu	pH
Epilimnion	9.07	1.41		120.7		4	8.53	10.03	0.77	7.10
Metalimnion				121.6		8			0.66	6.97
Hypolimnion				124.8		18			1.41	6.50
B + K Beach					2					
Boat Launch				123.3	23	9			1.09	7.15
Camp Spofford Inlet			57	249.7	43	66			3.03	6.85
Clarkdale Beach					2					
Clarkdale Pipe			72	304.0	30	24			17.40	6.85
Family Rec Beach					2					
Island North East					10					
Island North West					10					
Island South East					10					
Island South West					10					
Outlet			29	131.8	10	9			0.89	6.91
Seamans Inlet			163	584.0	97	15			3.92	7.01
Shield Inlet			38	198.7	10	7			4.16	7.00
Wares Grove Inlet			32	155.1	40	8			0.87	6.64
Yacht Club Beach					2					

NH Water Quality Standards: Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.
Chloride: > 230 mg/L (chronic)
E. coli: > 88 cts/100 mL – public beach
E. coli: > 406 cts/100 mL – surface waters
Turbidity: > 10 NTU above natural level
pH: between 6.5-8.0 (unless naturally occurring)

NH Median Values: Median values for specific parameters generated from historic lake monitoring data.
Alkalinity: 4.9 mg/L
Chlorophyll-a: 4.58 mg/m^3
Conductivity: 40.0 uS/cm
Chloride: 4 mg/L
Total Phosphorus: 12 ug/L
Transparency: 3.2 m
pH: 6.6

Historical Water Quality Trend Analysis

Parameter	Trend	Explanation	Parameter	Trend	Explanation
Conductivity	Worsening	Data significantly increasing.	Chlorophyll-a	Stable	Trend not significant; data moderately variable.
pH (epilimnion)	Stable	Trend not significant; data show low variability.	Transparency	Worsening	Data significantly decreasing.
			Phosphorus (epilimnion)	Stable	Trend not significant; data moderately variable.